Biodiversity Data Journal 13: e165844
doi: 10.3897/BDJ.13.e165844

Taxonomy & Inventories

Butterflies (Lepidoptera) of the Can Gio Mangrove Biosphere Reserve, Vietnam

Hiep Ngoc Dang‡, Hoan Duc Huynh‡, Trung Van Phan‡, Kiet Nguyen The Bui‡, Thao Thi Thu Luong‡, Vu Dang Hoang Nguyen§

‡ Can Gio Protection Forest Management Board, Ho Chi Minh City, Vietnam
§ Institute of Life Science, Vietnam Academy of Science and Technology, Ho Chi Minh City, Vietnam

Corresponding author: Hoan Duc Huynh (huynhduchoanpy@gmail.com), Vu Dang Hoang Nguyen (nguyendanghoangvu888@gmail.com)

Academic editor: Martin Wiemers

Received: 21 Jul 2025 | Accepted: 26 Sep 2025 | Published: 20 Oct 2025

Citation: Dang H, Huynh H, Phan T, Bui KT, Luong TT, Nguyen VH (2025) Butterflies (Lepidoptera) of the Can Gio Mangrove Biosphere Reserve, Vietnam. Biodiversity Data Journal 13: e165844. https://doi.org/10.3897/BDJ.13.e165844

Abstract

Background

The Can Gio Mangrove Biosphere Reserve is a unique transitional ecosystem between land and sea and represents a significant wetland area in southern Vietnam. Despite being recognised as a biodiversity hotspot, its butterfly fauna remains poorly documented.

New information

In this study, the Pollard Walk method was employed across 72 sampling events in 12 fixed transects, presenting the first comprehensive checklist and diversity assessment of butterflies (Lepidoptera, Rhopalocera) from this region. A total of 46 species, belonging to five families and 37 genera, were recorded through systematic field surveys conducted across 12 sites during both dry and rainy seasons from 2024 to 2025. The family Nymphalidae exhibited the highest species richness (19 species), followed by

© Dang H et al. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Lycaenidae (9 species), Pieridae (7 species), Hesperiidae (7 species) and Papilionidae (4 species). Two species of the most abundant were identified: *Catopsilia pomona* and *Ixias pyrene*. Our findings reveal that the butterfly community in Can Gio is moderately diverse (H' = 1.66 ± 0.52) and exhibits seasonal variation in species composition and abundance. The study provides baseline data for future biodiversity monitoring and highlights the importance of preserving the mosaic of habitats within this mangrove biosphere reserve.

Keywords

biodiversity, Nymphalidae, Lycaenidae, insect, species composition

Introduction

Butterflies (Lepidoptera, Rhopalocera) are widely recognised as important bioindicators of ecosystem health and are amongst the most studied insect groups due to their ecological roles, aesthetic appeal and sensitivity to environmental changes (McMullen 1965, Matteo et al. 2023, Irene et al. 2024). Their diversity and distribution patterns are closely linked to vegetation structure, climate and habitat quality, making them valuable indicators in biodiversity monitoring and conservation planning (Swaay CA et al. 2008).

Vietnam is considered one of the most biologically diverse countries in Southeast Asia and harbours a rich butterfly fauna, with over 1,200 species recorded to date (Monastyrskii and Devyatkin 2016). However, many regions, particularly lowland wetlands and mangrove ecosystems, remain underexplored in terms of their diversity.

The Can Gio Mangrove Biosphere Reserve, located in southern Vietnam, was designated as the country's first UNESCO Biosphere Reserve in 2000. Spanning more than 75,000 ha of restored and natural mangrove forests, it represents a critical transition zone between freshwater and marine ecosystems. The Reserve is well known for its ecological services and biodiversity, including birds, reptiles and aquatic invertebrates (Nguyen et al. 2013, Le 2021). However, its butterfly fauna has received little scientific attention, with no comprehensive checklist or systematic diversity assessments published prior to this study.

This study aims to address that gap by documenting the species composition and variation in butterfly diversity across different habitat types within the Can Gio Mangrove Biosphere Reserve. We also highlight species of conservation concern and discuss the implications for wetland biodiversity management. The data generated from this study contribute to national biodiversity inventories and can support long-term ecological monitoring programmes in southern Vietnam.

Materials and methods

Study area

Coordinates: N10°24'7.21" and N10°35'26.35" Latitude; E106°56'39.33" and E106°47'15.95" Longitude.

The study was conducted in the Can Gio Mangrove Biosphere Reserve, located approximately 40 km southeast of central Ho Chi Minh City, Vietnam. The Reserve spans over 75,000 hectares and includes a mosaic of habitats such as mangrove forests, plantations, tidal flats, salt evaporation ponds and estuarine channels. The study area is characterised by a mosaic of planted mangrove forests and naturally occurring vegetation communities. The mangrove plantations primarily consist of *Rhizophora apiculata* (double-stilt mangrove) and *Ceriops* spp., which are the most extensively cultivated taxa. Additional planted species include *Kandelia candel*, *Ceriops tagal*, *Ceriops zippeliana*, *Rhizophora mucronata*, *Bruguiera sexangula*, *Intsia bijuga*, *Thespesia populnea*, *Eucalyptus* spp., *Acacia auriculiformis* and *Casuarina equisetifolia*.

In parallel with these plantations, a variety of natural plant communities and populations are present, reflecting the ecological heterogeneity of the mangrove ecosystem. Characteristic assemblages include *Sonneratia caseolaris* and *Avicennia* spp.; *Avicennia* spp., *Phoenix paludosa* and *Intsia bijuga*; *Avicennia alba* and *Sonneratia alba*; as well as *Ceriops* spp., *Lumnitzera* spp. and *Excoecaria agallocha*. Distinct monodominant populations are also observed, such as stands of *Phoenix paludosa* and *Acrostichum aureum*. Other notable communities comprise *Acrostichum aureum*, *Phoenix paludosa*, *Cordia cochinchinensis* and *Pluchea indica*; populations of *Nypa fruticans*; and *Cyperus malaccensis*, *Derris* spp. and *Acanthus* spp.

Together, these plantations and natural vegetation types create a structurally diverse and ecologically functional landscape, supporting both biodiversity conservation and coastal ecosystem services (Nguyen et al. 2020).

Twelve transect surveys were selected, based on habitat heterogeneity and accessibility, including areas of natural mangroves (L5, L7, L8), monoculture mangrove plantations (L1, L2, L3 and L6) and transition zones (L4, L9, L10, L11 and L12) (Fig. 1).

Sampling effort

Six fieldwork Events were carried out between 2024 and 2025, covering both dry (November to April) and rainy (May to October) seasons at 12 transects (Fig. 1). Dates of observation on each transect are following:

- **Survey 2**:
    - 16 October 2024: L1, L6
    - 17October 2024: L7, L8, L9, L10

- 18 October 2024: L2, L3, L4, L5
- 19 October 2024: L11, L12.

- **Survey 3**:
  - 7 November 2024: L7, L8, L9, L10
  - 8 November 2024: L1, L6
  - 9 November 2024: L11, L12
  - 10 November 2024: L2, L3, L4, L5.
- **Survey 4**:
  - 10 January 2025: L2, L3, L4, L5
  - 11 January 2025: L7, L8, L9, L10
  - 12 January 2025: L1, L6
  - 13 January 2025: L11, L12.
- **Survey 5**:
  - 10 March 2025: L11, L12
  - 11 March 2025: L7, L8, L9, L10
  - 12 March 2025: L2, L3, L4, L5
  - 13 March 2025: L1, L6.
- **Survey 6**:
  - 23 May 2025: L2, L3, L9, L10
  - 24 May 2025: L4, L5
  - 25 May 2025: L1, L6, L7, L8
  - 26 May 2025: L11, L12.

Each study site was surveyed once per season, resulting in a total of 72 sampling events.

Sampling description

The data on butterfly assemblages were collected using the transect method described by Pollard (1977) and modified by Spitzer et al. (1993). One full observation includes one

pass. Observations occurred along each transect at a speed of approximately 20 m per min during day time from 7:30 am to 12:00 am and all observed butterflies were recorded. Species that require further identification were collected using a butterfly net.

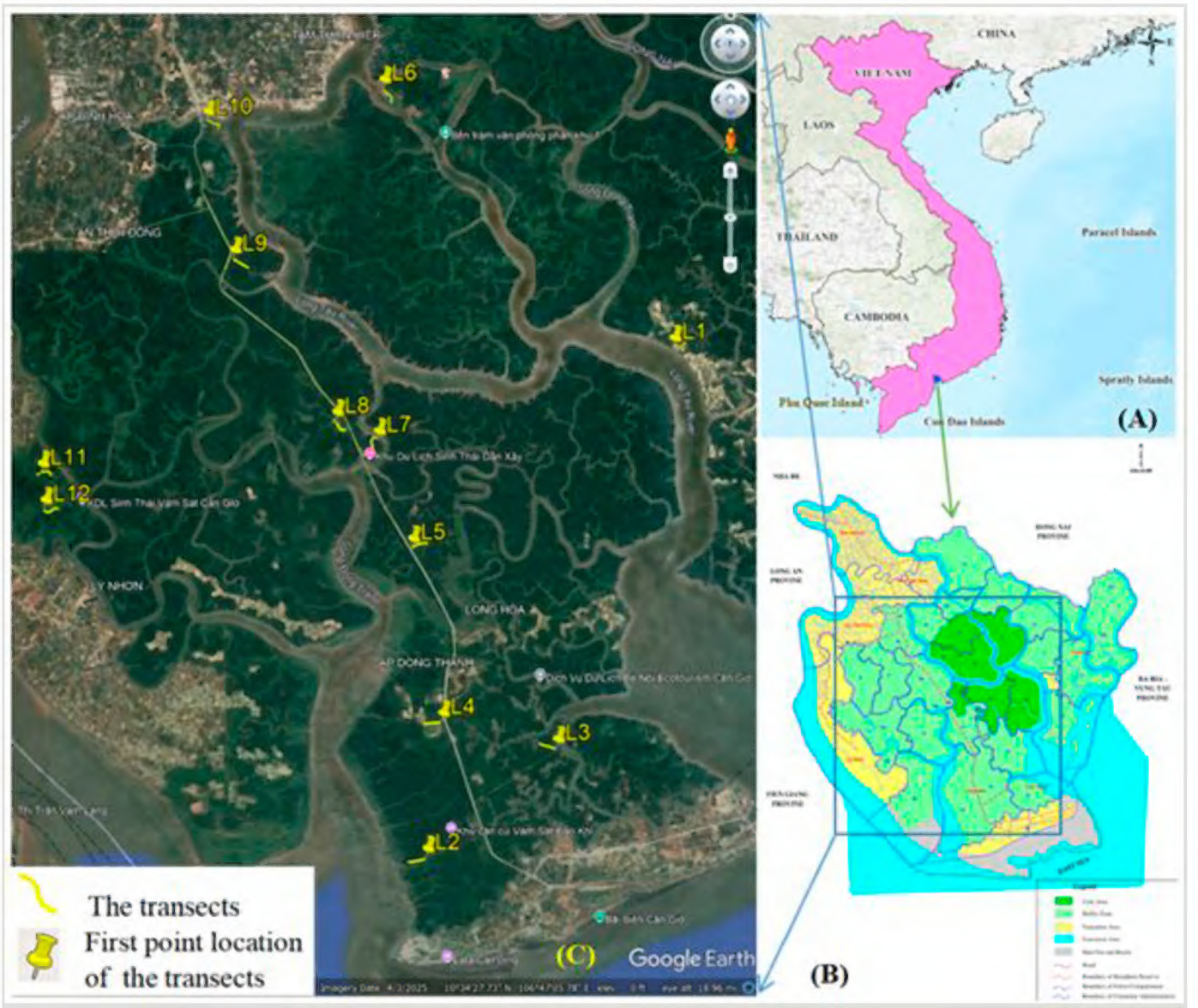

Figure 1. doi

Map of the study sites. **A** Location of Can Gio Mangrove Biosphere Reserve on a map of Vietnam; **B** The study area on the Can Gio Mangrove Biosphere Reserve; **C** Ecosystems and survey areas within Can Gio Mangrove Biosphere Reserve. The map was created with QGIS software version 3.34.11. The ecosystem layer data for Google Earth Pro version 7.3.6.10201. The base map of Vietnam was sourced from GADM (Global Administrative Areas) at https://gadm.org/download_country.html

Species identification

Butterflies were collected and identified in the field using standard field guides (McMullen 1965, Carter 1992, Monastyrskii 2005, Bui 2007, Monastyrskii 2007, Monastyrskii 2011, Monastyrskii and Devyatkin 2016, Monastyrskii 2019, Monastyrskii 2024, Inayoshi 2025). Species-level identifications were verified by taxonomic specialists and cross-checked with the GBIF database (https://www.gbif.org/). Nomenclature follows the most recent classification by the GBIF database (GBIF - Global Biodiversity Information Facility 2025, Inayoshi 2025).

Diversity Analysis

Butterfly diversity was compiled and annotated with habitat association from L1-L12 (Suppl. material 1), then diversity patterns were calculated for each transect using Excel, BioDiversity Professional Version 2.0 (McAleece et al. 1997), Statgraphics Version XIX Version (Nguyen 2009). The Shannon-Wiener diversity index $H' = -LPilnPi$ where the quantity P*i* is the proportion of individuals found in the i^{th} species and a sample the true value of P*i* is unknown, but is estimated as ni/N (Shannon and Wiener 1963, Bibi and Ali 2013, Magurran 2013). Simpson dominance index $D = (n_i(n_i - 1))/(N(N - 1))$ where n_i = the number of individuals in the i^{th} species and N = the total number of individuals (Simpson 1949, Okpiliya 2012, Magurran 2013).

Data resources

Our survey revealed a moderately high level of butterfly diversity in the Can Gio Mangrove Biosphere Reserve, with species composition of 46 species from five families. The number of butterfly species recorded in the study area during each survey ranged from 19 to 25 species. Through continuous survey efforts along the transects, it was observed that, from the fourth survey onwards, the number of newly-encountered species was negligible. This indicates that the survey results are approaching the estimated species richness of butterflies in the study area (Fig. 2).

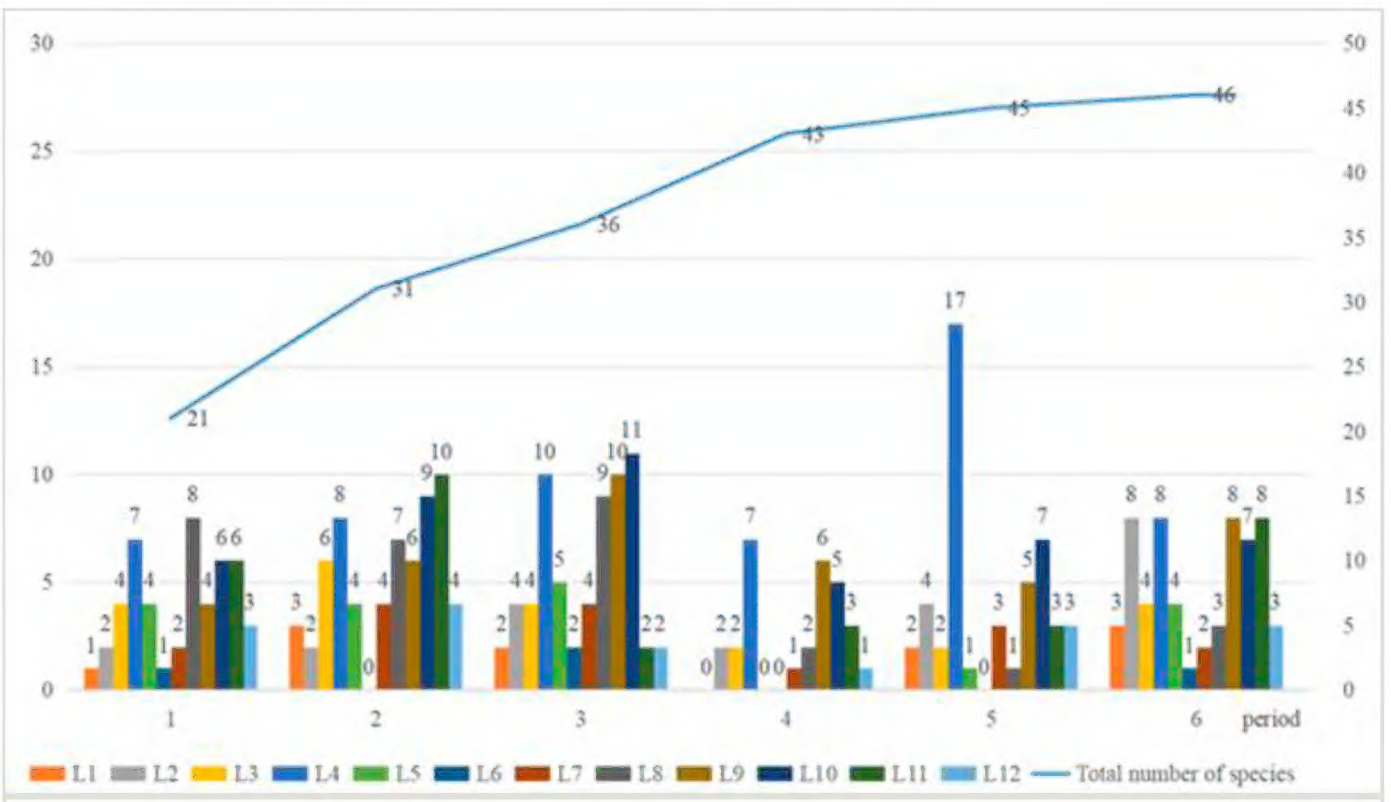

Figure 2. doi

Species accumulation curve of the recorded species across six field surveys.

Field surveys to record species composition with photos as evidence of records (Figs 3, 4, 5, 6, 7, 8) and abundance in each transect (Suppl. material 1). These data provide a foundation for calculating key biodiversity metrics, such as the Shannon-Wiener diversity

index and evenness. The results aim to contribute to the ecological assessment and conservation management of the Can Gio mangrove ecosystem.

Figure 3. doi

Family Hesperiidae: **A** *Hasora badra* ♂; **B** *Hyarotis adrastus*; **C** *Parnara apostata* ♀; **D** *Potanthus* sp.; **E1, E2** *Pelopidas mathias* ♂; Family Lycaenidae; **F1, F2** *Arhopala centaurus* ♀. Photos by Dang H.N.

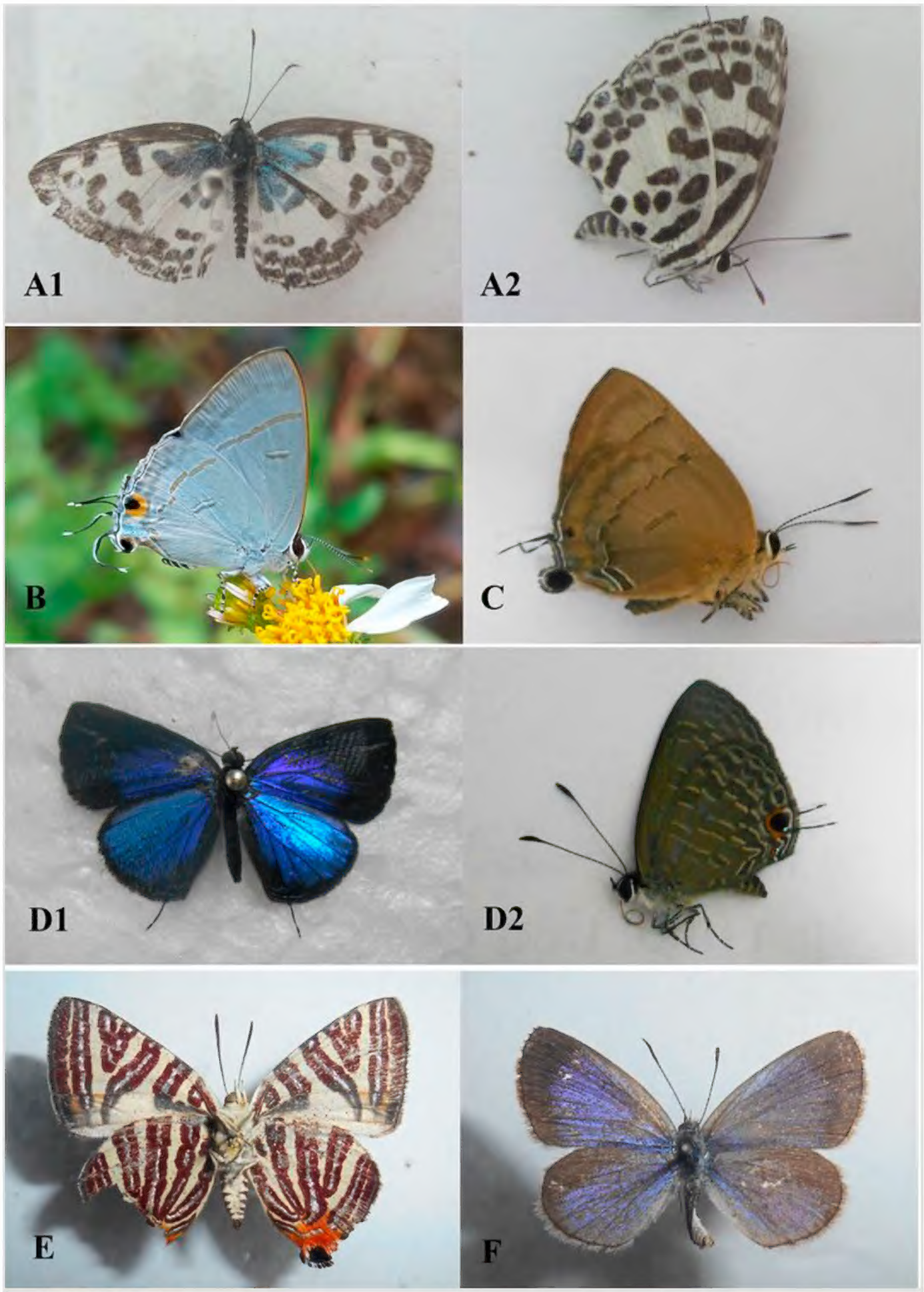

Figure 4. doi

Family Lycaenidae: **A1, A2** *Castalius rosimon* ♀; **B** *Hypolycaena erylus*; **C** *Rapala pheretima* ♀; **D1, D2** *Jamides bochus* ♂; **E** *Cigaritis lohita* ♀; **F** *Zizina otis* ♂. Photos by Dang H.N.

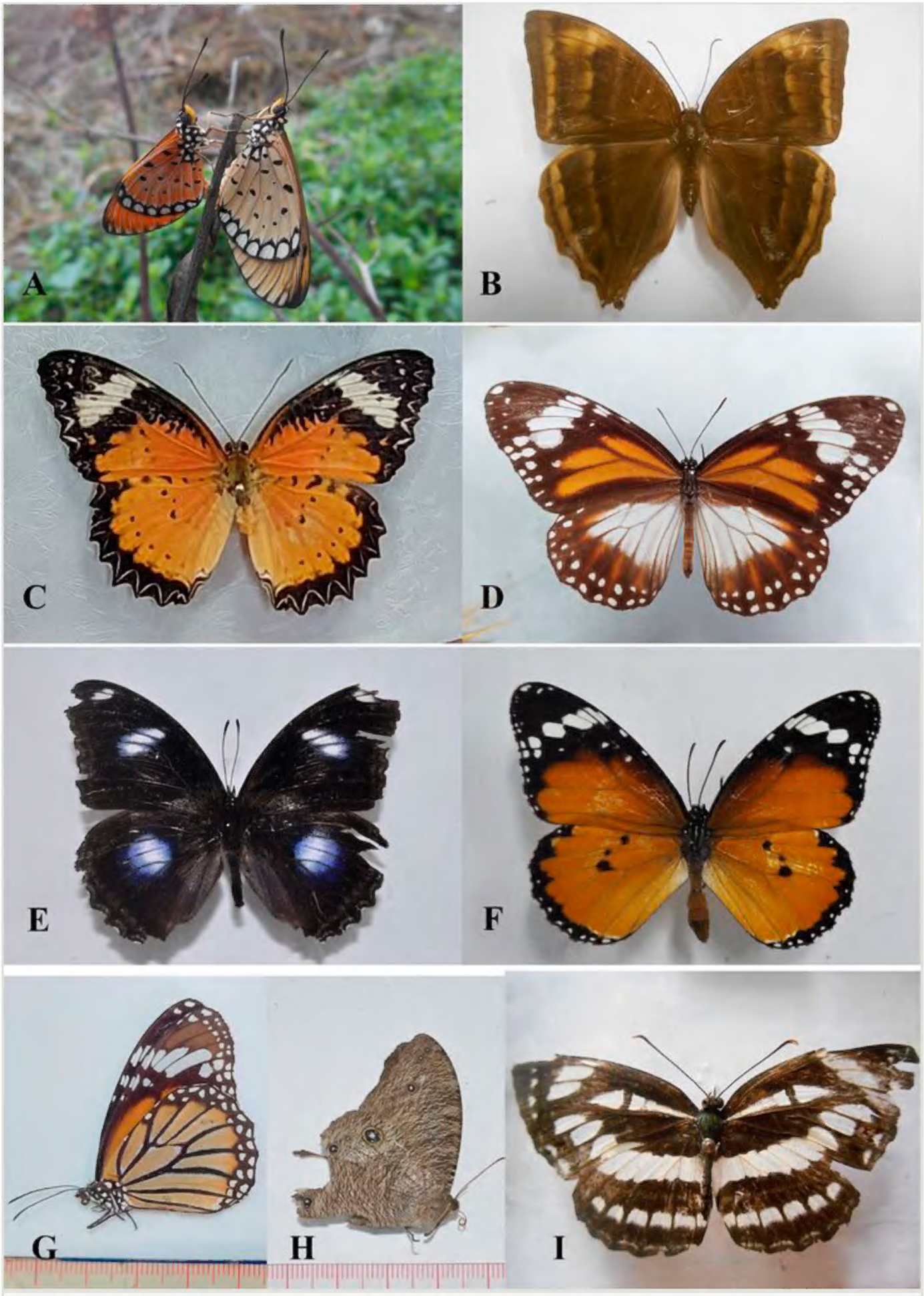

Figure 5. doi

Family Nymphalidae: **A** *Acraea terpsicore* ♂(left), ♀(right); **B** *Amathusia phidippus* ♀; **C** *Cethosia cyane* ♂; D *Danaus affinis* ♀; **E** *Hypolimnas bolina* ♂; **F** *Danaus chrysippus* ♀; **G** *Danaus genutia* ♀; **H** *Melanitis leda*; **I** *Neptis hylas* ♀. Photos by Dang H.N.

Figure 6. doi

Family Nymphalidae: **A** *Euploea core* ♂; **B** *Euploea mulciber* ♂; **C** *Tirumala limniace* ♂; **D** *Ideopsis similis* ♂; **E** *Parantica agleoides* ♀; **F** *Elymnias hypermnestra* ♀; **G** *Junonia almana* ♂; **H** *Junonia lemonias* ♀. Photos by Dang H.N.

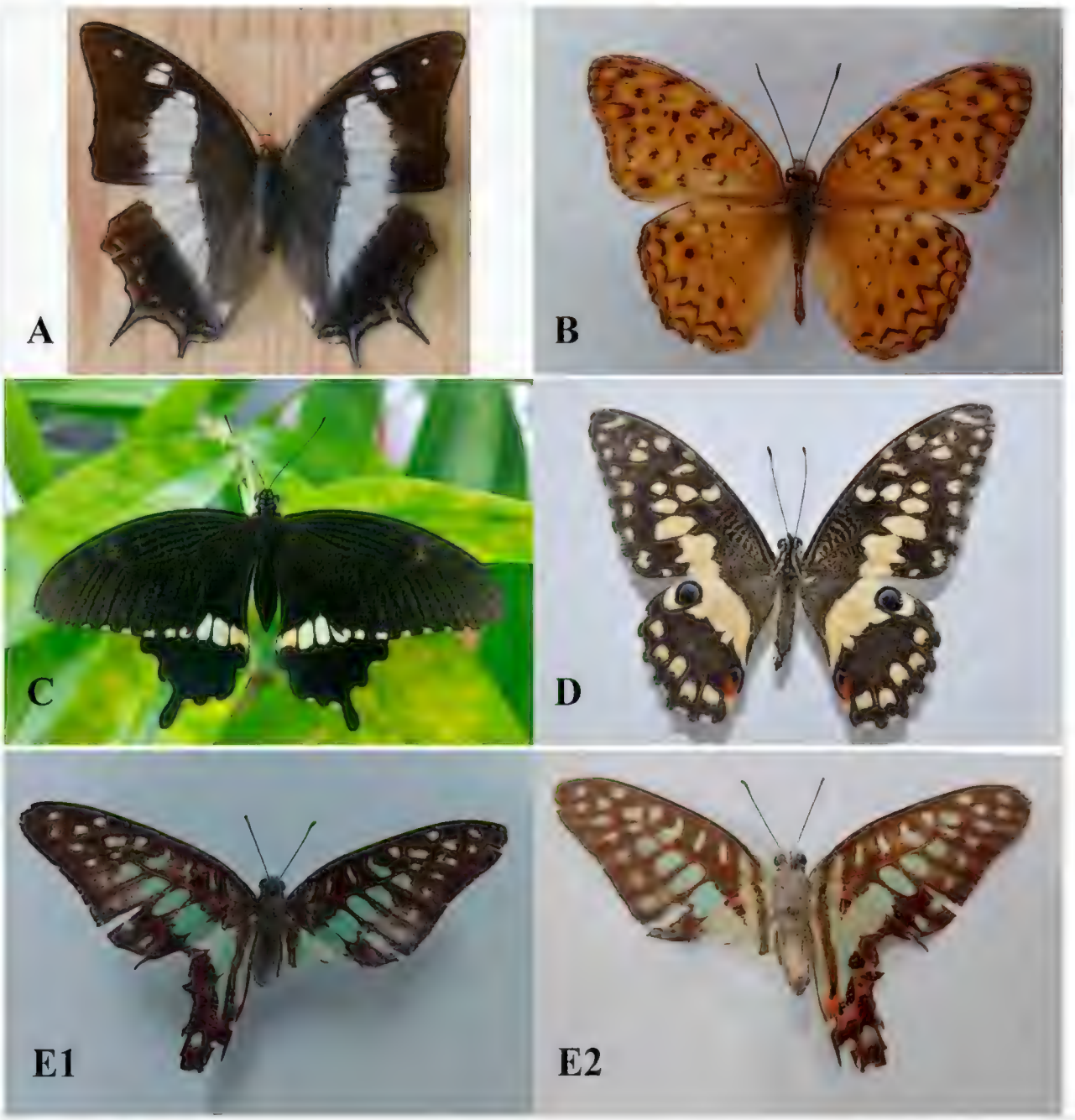

Figure 7. doi

Family Nymphalidae: **A** *Polyura schreiber* ♀; **B** *Phalanta phalantha* ♂. Family Papilionidae; **C** *Papilio polytes* ♂; **D** *Papilio demoleus* ♀; **E1, E2** *Graphium doson* ♀. Photos by Dang H.N.

Butterfly species recorded in the Can Gio Mangrove Biosphere Reserve in this study

Family Hesperiidae Latreille, 1809

Hasora badra (Moore, [1857])

Material

a. genus: *Hasora*; specificEpithet: *badra*; scientificNameAuthorship: (Moore, [1857]); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 12/01/2025; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0163

Notes: Recorded in Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 3A).

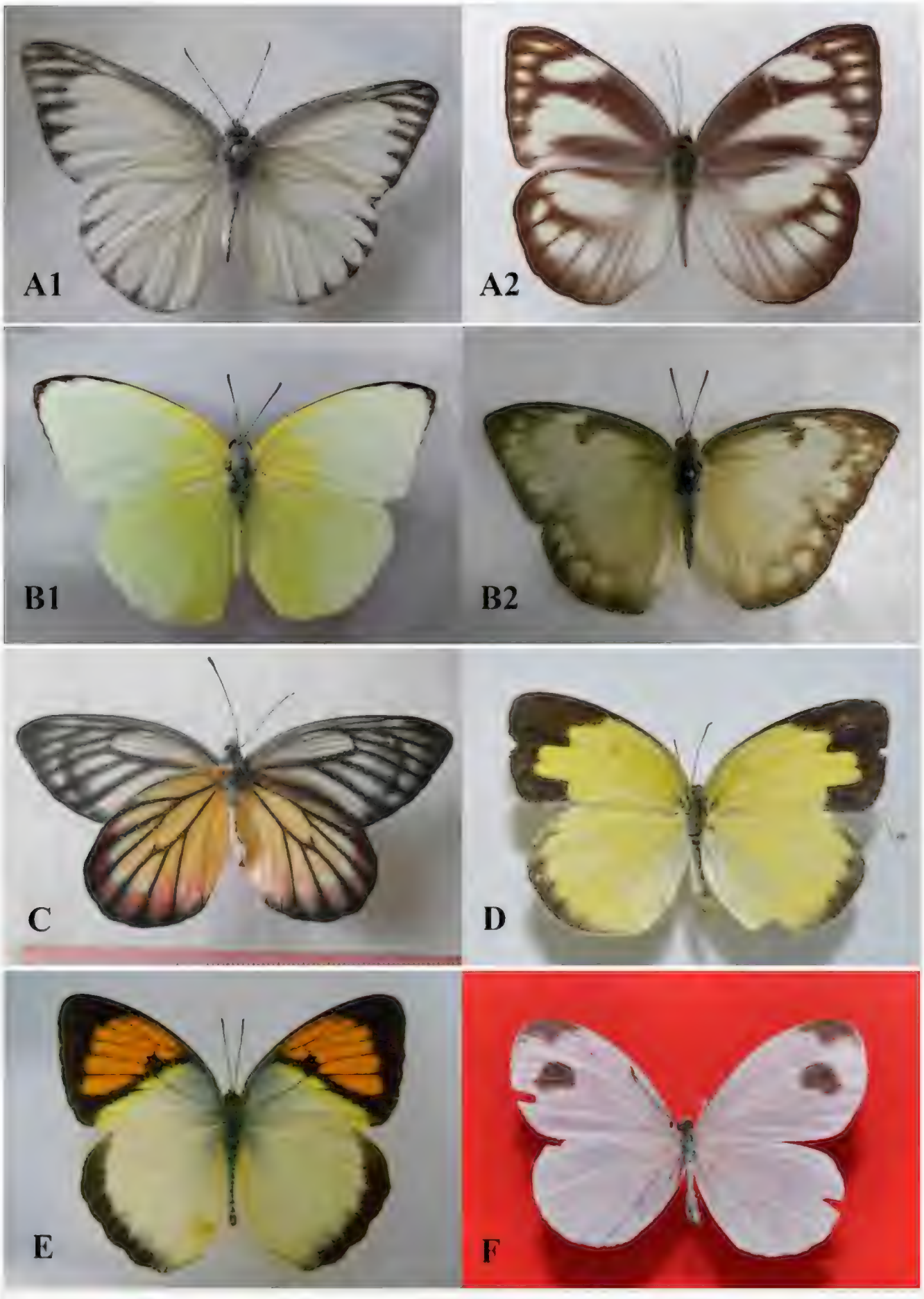

Figure 8. doi

Family Pieridae: **A1, A2** *Appias olferna*; **B1, B2** *Catopsilia pomona*; **C** *Delias hyparete*; D *Eurema hecabe*; **E** *Ixias pyrene*; **F** *Leptosia nina*. Photos by Dang H.N.

Hasora chromus (Cramer, 1780)

Material

a. genus: *Hasora*; specificEpithet: *chromus*; scientificNameAuthorship: (Cramer, 1780); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 13/03/2025; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0222

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study.

Hyarotis adrastus (Stoll, 1780)

Material

a. genus: *Hyarotis* ; specificEpithet: *adrastus*; scientificNameAuthorship: (Stoll, 1782); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/03/2025; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0194

Notes: Recorded in Bui (2007), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 3B).

Iambrix salsala (Moore, 1866)

Material

a. genus: *Iambrix*; specificEpithet: *salsala*; scientificNameAuthorship: (Moore, 1866); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 09/11/2024; individualCount: 2; sex: unknown; occurrenceID: CANGIOMB0105

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study.

Parnara apostata (Snellen, 1880)

Material

a. genus: *Parnara*; specificEpithet: *apostata*; scientificNameAuthorship: (Snellen, 1880); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 05/09/2024; individualCount: 2; sex: unknown; occurrenceID: CANGIOMB0018

Notes: Recorded in Bui (2007), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 3C).

Pelopidas mathias (Fabricius, 1798)

Material

a. genus: *Pelopidas*; specificEpithet: *mathias*; scientificNameAuthorship: (Fabricius, 1798); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 17/10/2024; individualCount: 3; sex: unknown; occurrenceID: CANGIOMB0056

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 3E1, E2).

Potanthus sp.

Material

a. genus: *Potanthus*; infraspecificEpithet: sp.; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 19/10/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0075

Notes: Recorded in Monastyrskii and Devyatkin (2016), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 3D).

Family Lycaenidae Leach, 1815

Arhopala centaurus (Fabricius, 1775)

Material

a. genus: *Arhopala*; specificEpithet: *centaurus*; scientificNameAuthorship: (Fabricius, 1775); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 13/01/2025; individualCount: 3; sex: unknown; occurrenceID: CANGIOMB0174

Notes: Recorded in Monastyrskii and Devyatkin (2016), GBIF - Global Biodiversity Information Facility (2025), India Biodiversity Portal (2024), Inayoshi (2025) and this study (Fig. 3F1, F2).

Arhopala elopura H.H. Druce, 1894

Material

a. genus: *Arhopala*; specificEpithet: *elopura*; scientificNameAuthorship: Druce, 1894; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 09/11/2024; individualCount: 2; sex: uknown; occurrenceID: CANGIOMB0106

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study.

Castalius rosimon (Fabricius, 1775)

Material

a. genus: *Castalius*; specificEpithet: *rosimon*; scientificNameAuthorship: (Fabricius, 1775); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 10/11/2024; individualCount: 2; sex: unknown; occurrenceID: CANGIOMB0118

Notes: Recorded in Carter (1992), Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 4A1, A2).

Cigaritis lohita (Horsfield, 1829)

Material

a. genus: *Cigaritis* ; specificEpithet: *lohita*; scientificNameAuthorship: (Horsfield, 1829); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/01/2025; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0146

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), Inayoshi (2025) and this study (Fig. 4E).

Curetis saronis Moore, 1877

Material

a. genus: *Curetis*; specificEpithet: *saronis*; scientificNameAuthorship: Moore, 1877; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 17/10/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0052

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study.

Hypolycaena erylus (Godart, [1823])

Material

a. genus: *Hypolycaena* ; specificEpithet: *erylus*; scientificNameAuthorship: (Godart, [1823]); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 04/09/2024; individualCount: 3; sex: unknown; occurrenceID: CANGIOMB0010

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 4B).

Jamides bochus (Stoll 1782)

Material

a. genus: *Jamides* ; specificEpithet: *bochus*; scientificNameAuthorship: (Stoll, 1782); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/03/2025; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0201

Notes: Recorded in Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 4D1, D2).

Rapala pheretima (Hewitson, 1863)

Material

a. genus: *Rapala* ; specificEpithet: *pheretima*; scientificNameAuthorship: (Hewitson, 1863); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 07/11/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0085

Notes: Recorded in Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 4C).

Zizina otis (Fabricius, 1787)

Material

a. genus: *Zizina* ; specificEpithet: *otis*; scientificNameAuthorship: (Fabricius, 1787); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 04/09/2024; individualCount: 50; sex: unknown; occurrenceID: CANGIOMB0007

Notes: Recorded in Carter (1992), Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 4F).

Family Nymphalidae Rafinesque, 1815

Acraea terpsicore (Linnaeus, 1758)

Material

a. genus: *Acraea* ; specificEpithet: *terpsicore*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/01/2025; individualCount: 2; sex: unknown; occurrenceID: CANGIOMB0154

Notes: Recorded in Bui (2007), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 5A).

Amathusia phidippus (Linnaeus, 1763)

Material

a. genus: *Amathusia* ; specificEpithet: *phidippus*; scientificNameAuthorship: (Linnaeus, 1763); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 09/11/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0099

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 5B).

Cethosia cyane Fruhstorfer, 1912

Materials

a. genus: *Cethosia* ; specificEpithet: *cyane*; scientificNameAuthorship: Fruhstorfer, 1912; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 08/11/2024; individualCount: 4; sex: male; occurrenceID: CANGIOMB0094

b. genus: *Cethosia* ; specificEpithet: *cyane*; scientificNameAuthorship: Drury, 1773; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/01/2025; individualCount: 2; sex: female; occurrenceID: CANGIOMB0151

Notes: Recorded in Bui (2007), India Biodiversity Portal (2024), Inayoshi (2025) and this study (Fig. 5C).

Danaus affinis (Fabricius, 1775)

Materials

a. genus: *Danaus* ; specificEpithet: *affinis*; scientificNameAuthorship: (Fabricius, 1775); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 04/09/2024; individualCount: 5; sex: male; occurrenceID: CANGIOMB0008

b. genus: *Danaus* ; specificEpithet: melanippus; scientificNameAuthorship: Cramer, 1777; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 25/05/2025; individualCount: 1; sex: female; occurrenceID: CANGIOMB0012

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 5D).

Danaus chrysippus (Linnaeus, 1758)

Material

a. genus: *Danaus* ; specificEpithet: *chrysippus*; scientificNameAuthorship: ((Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 23/05/2025; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0233

Notes: Recorded in Carter (1992), Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 5F).

Danaus genutia (Cramer, 1779)

Material

a. genus: *Danaus*; specificEpithet: *genutia*; scientificNameAuthorship: (Cramer, 1779); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 16/10/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0034

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 5G).

Elymnias hypermnestra (Linnaeus, 1763)

Materials

a. genus: *Elymnias* ; specificEpithet: *hypermnestra*; scientificNameAuthorship: (Linnaeus, 1763); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 07/11/2024; individualCount: 1; sex: male; occurrenceID: CANGIOMB0089

b. genus: *Elymnias* ; specificEpithet: *hypermnestra*; scientificNameAuthorship: Linnaeus, 1763; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/03/2025; individualCount: 1; sex: female; occurrenceID: CANGIOMB0197

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 6F).

Euploea core (Cramer, 1780)

Material

a. genus: *Euploea*; specificEpithet: *core*; scientificNameAuthorship: (Cramer, 1780); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/01/2025; individualCount: 21; sex: unknown; occurrenceID: CANGIOMB0142

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 6A).

Euploea mulciber (Cramer, 1777)

Material

a. genus: *Euploea* ; specificEpithet: *mulciber*; scientificNameAuthorship: (Cramer, 1777); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/01/2025; individualCount: 2; sex: unknown; occurrenceID: CANGIOMB0157

Notes: Recorded in Carter (1992), Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 6B).

Hypolimnas bolina (Linnaeus, 1758)

Material

a. genus: *Hypolimnas* ; specificEpithet: *bolina*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/03/2025; individualCount: 4; sex: unknown; occurrenceID: CANGIOMB0192

Notes: Recorded in Carter (1992), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study.

Ideopsis similis (Linnaeus, 1758)

Material

a. genus: *Ideopsis* ; specificEpithet: *similis*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 12/03/2025; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0216

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 6D).

Junonia almana (Linnaeus, 1758)

Material

a. genus: *Junonia* ; specificEpithet: *almana*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 17/10/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0053

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 6G).

Junonia lemonias (Linnaeus, 1758)

Material

a. genus: *Junonia* ; specificEpithet: *lemonias*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 17/10/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0049

Notes: Recorded in Carter (1992), Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 6H).

Melanitis leda (Linnaeus, 1758)

Material

a. genus: *Melanitis* ; specificEpithet: *leda*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 10/01/2025; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0128

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 5H).

Neptis hylas (Linnaeus, 1758)

Material

a. genus: *Neptis* ; specificEpithet: *hylas*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 17/10/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0086

Notes: Recorded in Bui (2007), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 5I).

Phalanta phalantha (Drury, 1773)

Material

a. genus: *Phalanta* ; specificEpithet: *phalantha*; scientificNameAuthorship: (Drury, 1773); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 17/10/2024; individualCount: 14; sex: unknown; occurrenceID: CANGIOMB0043

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 7B).

Polyura schreiber (Godart, [1824])

Material

a. genus: *Polyura* ; specificEpithet: *schreiber*; scientificNameAuthorship: (Godart, [1824]); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 04/09/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0014

Notes: Recorded in GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 7A).

Tirumala limniace (Cramer, 1775)

Material

a. genus: *Tirumala* ; specificEpithet: *limniace*; scientificNameAuthorship: (Cramer, 1775); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 18/10/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0068

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 6C).

Parantica agleoides (Felder & Felder, 1860)

Material

a. genus: *Parantica* ; specificEpithet: *agleoides*; scientificNameAuthorship: (Felder & Felder, 1860); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/01/2025; individualCount: 3; sex: unknown; occurrenceID: CANGIOMB0269

Notes: Recorded in Monastyrskii and Devyatkin (2016), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 6E).

Family Papilionidae Latreille, 1802

Graphium arycles (Boisduval, 1836)

Material

a. genus: *Graphium*; specificEpithet: *arycles*; scientificNameAuthorship: (Boisduval, 1836); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 03/09/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0005

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study.

Graphium doson (C. Felder & R. Felder, 1864)

Material

a. genus: *Graphium* ; specificEpithet: *doson*; scientificNameAuthorship: (C. Felder & R. Felder, 1864); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 23/05/2025; individualCount: 1; sex: female; occurrenceID: CANGIOMB0238

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 7E1, E2).

Papilio demoleus Linnaeus, 1758

Material

a. genus: *Papilio* ; specificEpithet: *demoleus*; scientificNameAuthorship: Linnaeus, 1758; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 11/03/2025; individualCount: 1; sex: female; occurrenceID: CANGIOMB0191

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 7D).

Papilio polytes Linnaeus, 1758

Materials

a. genus: *Papilio* ; specificEpithet: *polytes*; scientificNameAuthorship: Linnaeus, 1758; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 18/10/2024; individualCount: 1; sex: male; occurrenceID: CANGIOMB0059

b. genus: *Papilio* ; specificEpithet: *polytes*; scientificNameAuthorship: Linnaeus, 1758; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 25/05/2025; individualCount: 1; sex: female; occurrenceID: CANGIOMB0259

Notes: Recorded in Carter (1992), Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 7C).

Family Pieridae Swainson, 1820

Appias olferna Swinhoe, 1890

Materials

a. genus: *Appias* ; specificEpithet: *olferna*; scientificNameAuthorship: Swinhoe, 1890; country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 03/9/2024; individualCount: 15; sex: female; occurrenceID: CANGIOMB0019

b. genus: *Appias*; specificEpithet: *libythea*; scientificNameAuthorship: (Fabricius, 1775); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 24/05/2025; individualCount: 26; sex: male; occurrenceID: CANGIOMB0247

Notes: Recorded in Bui (2007), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 8A1, A2).

Catopsilia pomona (Fabricius, 1775)

Materials

a. genus: *Catopsilia*; specificEpithet: *pomona*; scientificNameAuthorship: (Fabricius, 1775); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 19/10/2025; individualCount: 143; sex: male; occurrenceID: CANGIOMB0176

b. genus: *Catopsilia*; specificEpithet: *pomona*; scientificNameAuthorship: (Fabricius, 1775); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 10/03/2025; individualCount: 52; sex: female; occurrenceID: CANGIOMB0177

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 8B1, B2).

Catopsilia pyranthe (Linnaeus, 1758)

Material

a. genus: *Catopsilia*; specificEpithet: *pyranthe*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 10/11/2024; individualCount: 1; sex: unknown; occurrenceID: CANGIOMB0111

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study.

Delias hyparete (Linnaeus, 1758)

Material

a. genus: *Delias* ; specificEpithet: *hyparete*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 17/10/2024; individualCount: 2; sex: unknown; occurrenceID: CANGIOMB0087

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 8C).

Eurema hecabe (Linnaeus, 1758)

Material

a. genus: *Eurema* ; specificEpithet: *hecabe*; scientificNameAuthorship: (Linnaeus, 1758); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 23/05/2025; individualCount: 9; sex: unknown; occurrenceID: CANGIOMB0230

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 8D).

Ixias pyrene (Linnaeus, 1764)

Material

a. genus: *Ixias* ; specificEpithet: *pyrene*; scientificNameAuthorship: (Linnaeus, 1764); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 07/11/2025; individualCount: 40; sex: unknown; occurrenceID: CANGIOMB0195

Notes: Recorded in Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 8E).

Leptosia nina (Fabricius, 1793)

Material

a. genus: *Leptosia* ; specificEpithet: *nina*; scientificNameAuthorship: (Fabricius, 1793); country: Vietnam; stateProvince: Ho Chi Minh City; eventDate: 13/01/2025; individualCount: 14; sex: unknown; occurrenceID: CANGIOMB0170

Notes: Recorded in Bui (2007), Monastyrskii and Devyatkin (2016), India Biodiversity Portal (2024), GBIF - Global Biodiversity Information Facility (2025), Inayoshi (2025) and this study (Fig. 8F).

Analysis

The average Simpson index (D) in the total survey was 0.29 ± 0.05 close to 0, demonstrating that there was dominance of some species amongst the butterflies in the surveyed transects (Table 1). Of which, L2 had the highest dominance, followed by L1, L7 and L12 with D index values of 0.74, 0.44, 0.36 and 0.35, respectively. This shows that the butterfly community was dominated by some species including *C. pomona*, *I. pyrene*, *A. libythea* etc., in which, *C. pomona* appeared in and was dominant in most of the surveyed transects with 711 encountered individuals.

Butterfly diversity varied amongst transects, with the highest (1.93–2.53) at the transition zones (transect L4, L9, L10 and L11) (Table 1). In contrast, sites dominated by

monoculture mangrove plantations (L1, L2 and L6) had lowest diversity (0.07–1.13). The areas of natural mangroves (L7, L8) were average in diversity (1.68–1.73). Overall, butterfly diversity was moderately high, with a mean Shannon-Wiener index (H') of 1.66 ± 0.15.

Table 1.

Biological index by survey transects from L1 to L12. Note: areas of natural mangroves (L5, L7, L8), monoculture mangrove plantations (L1, L2, L3 and L6) and transition zone (L4, L9, L10, L11 and L12)

Index	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	AVG	SE	SD
H'	1.13	0.70	1.79	2.53	2.06	1.04	1.68	1.73	1.93	1.98	2.03	1.35	1.66	0.15	0.52
D	0.44	0.74	0.22	0.11	0.12	0.17	0.36	0.30	0.22	0.25	0.18	0.35	0.29	0.05	0.17
H'dry season	1.16	0.30	1.61	2.08	2.01	0.69	1.50	1.61	1.79	1.99	2.09	1.61	1.54	0.16	0.56
H'rainy season	0.82	1.81	1.65	2.37	1.03	0.69	1.30	1.73	1.79	1.83	1.64	0.77	1.45	0.15	0.52

The dominance of the family Nymphalidae is consistent with patterns observed in other Southeast Asian tropical lowland forests (Monastyrskii 2011). Their ecological versatility, broader host plant range and adaptability to a variety of microhabitats likely contribute to their high representation. Conversely, the relatively lower species diversity in monoculture mangrove plantations may reflect habitat simplification and the absence of larval host plants or nectar sources.

Discussion

Although the present study provides the first comprehensive checklist for Can Gio Mangrove Biosphere Reserve, we acknowledge that butterfly diversity may still be under-represented due to methodological limitations (e.g. reliance on visual surveys and daytime sampling). Future studies incorporating traps, longer survey durations and larval host plant assessments would help provide a more complete picture.

This study presents the first comprehensive assessment of butterfly diversity in the Can Gio Mangrove Biosphere Reserve, highlighting a moderately high level of species abundance across five families. The baseline data generated herein can support future biodiversity monitoring, ecological restoration and conservation planning in mangrove and lowland wetland systems in Vietnam. We recommend ongoing monitoring, integration of additional sampling methods and targeted habitat management to maintain and enhance butterfly diversity in the Reserve.

In conclusion, the Can Gio Mangrove Biosphere Reserve supports a diverse assemblage of butterflies. Protecting the mosaic of habitats — particularly transitional and edge areas — is essential for sustaining Rhopalocera diversity in this important wetland landscape.

Acknowledgements

The project was funded by the Youth Science and Technology Incubator Program, managed by the Center for Youth Science and Technology Development - Ho Chi Minh City Youth Union and the Department of Science and Technology of Ho Chi Minh City, under contract No. 29/2024/HD-KHCNT-VU, "Biodiversity of insect species in the Can Gio Mangrove Biosphere Reserve". We would like to thank the Can Gio District Forest Protection Management Board for allowing this research and the Department of Natural Resources Management and Development for their support during the field survey, specimen collection and processing. We would like to thank Dr. Martin Wiemers, the anonymous reviewers and the editorial team for their helpful comments to improve the article.

Author contributions

Dang Ngoc Hiep developed the research idea. Dang Ngoc Hiep, Bui Nguyen The Kiet and Luong Thi Thu Thao collected the data. Dang Ngoc Hiep and Phan Van Trung analysed the data and wrote the first draft. Huynh Duc Hoan, Dang Ngoc Hiep and Nguyen Dang Hoang Vu edited the final draft. Nguyen Dang Hoang Vu submitted the manuscript to the journal.

References

- Bibi F, Ali Z (2013) Measurement ofdiversityindicesofavian communities attaunsa barrage wildlife Sanctuary, Pakistan. J Anim Plant Sci 23 ((2)): 469-474.
- Bui MH (2007) Butterfly species of Phu Quoc. WAR (Wildlife at risk), 169 pp. [In Vietnamese].
- Carter D (1992) Butterflies and Moths. Dorling Kindersley Handbooks, 304 pp.
- GBIF - Global Biodiversity Information Facility (2025) Free and open access to biodiversity data. https://www.gbif.org. Accessed on: 2025-5-14.
- Inayoshi Y (2025) A Check List of Butterflies in Indo-China Chiefly from Thailand, Laos & Vietnam. https://yutaka.it-n.jp/. Accessed on: 2025-8-31.
- India Biodiversity Portal (2024) Free and open access to India's biodiversity information. https://indiabiodiversity.org (Accessed 14 May 2025).. Accessed on: 2012-5-14.
- Irene C, Muhamad NI, Aainaa A, Farah KK, Nor SS (2024) Species diversity and abundance of butterflies (Lepidoptera: Rhopalocera) in Lata Hokkaido, Jeli, Kelantan. In: Irene C, et al. (Ed.) BIO Web of Conferences, 131., 01011, 10 pp. https://doi.org/10.1051/bioconf/202413101011
- Le TB (2021) Research on building mechanisms and cooperation models between tourism development and sustainable conservation of biodiversity in Can Gio Biosphere Reserve. Summary report on scientific and technological results of the project.
- Magurran AE (2013) Ecological diversity and its measurement. Springer Science & Business Media., 179 pp.

- Matteo P, Enzo G, Chiara A, Gianandrea LP, Laura T, Enrico D, Beatrice M, Chiara P, Paola G, Roberta S, Cappelletti D (2023) Butterflies as bioindicators of metal contamination. *Environmental Science and Pollution Research* 30: 95606-95620. https://doi.org/10.1007/s11356-023-28930-x
- McAleece N, Gage J, Lambshead P, Paterson G (1997) BioDiversity Professional statistics analysis software. Jointly developed by the Scottish Association for Marine Science and the Natural History Museum London
- McMullen R (1965) The Insect Collector's Guide. edited version of Lysyk TJ. 1995.. Entomological Society of Alberta
- Monastyrskii A (2005) Butterflies of Vietnam: Nymphalidae: Satyrinae. Volume 1. Dolphin Media Company, 199 pp.
- Monastyrskii A (2007) Butterflies of Vietnam: Papilionidae. Volume 2. in Vietnam
- Monastyrskii A (2011) Butterflies of Vietnam: Nymphalidae: Danainae, Amathusiinae. Volume 3. Hanoi: Vietnam-Russian Tropical Centre
- Monastyrskii A, Devyatkin A (2016) Butterflies of Vietnam:(an Illustrated Checklist). Vietnam Publishing House of Natural Resources, Environment and Cartography, 115 pp.
- Monastyrskii A (2019) Butterflies of Vietnam: Nymphalidae: (I) Libytheinae, Calinaginae, Apaturinae, Charaxinae, Nymphalinae, Biblidinae, Pseudergolinae, Cyrestinae, Heliconiinae; (II) Limenitidinae. Volume 4. in Vietnam
- Monastyrskii A (2024) Butterflies of Vietnam: Pieridae (Whites & Yellows). Volume 5. in Vietnam
- Nguyen CM (2009) Textbook of Statistics in Forestry. Ho Chi Minh City University of Agriculture and Forestry [In Vietnamese].
- Nguyen PT, Le MD, Le VS, Huynh DH, Nguyen HM, Phan VT, Bui NTK (2020) The Second 10-Year Periodic Review Report (2010–2020) of the Can Gio Mangrove Biosphere Reserve, Ho Chi Minh City, Vietnam. 332 pages.
- Nguyen TV, Nguyen CN, Nguyen TD, Nguyen HT (2013) The Zoobenthos of the Can Gio Mangrove Ecosystem. Publishing House of Natural Science and Technology [In Vietnamese].
- Okpiliya FI (2012) Ecological diversity indices: Any hope for one again. JEES 2 (10): 45-52.
- Pollard E (1977) A Method for Assessing Changes in the Abundance of Butterflies. Biological Conservation 12: 115-134. https://doi.org/10.1016/0006-3207(77)90065-9
- Shannon C, Wiener W (1963) The mathematical theory of communities. Urbana University, Illinois Press
- Simpson EH (1949) Measurement of diversity. Nat 163 (688): 10-1038.
- Spitzer K, Novotny V, Tonner M, Leps J (1993) Habitat preferences, distribution and seasonality of the butterflies (Lepidoptera: Papilionoidea) in a montane tropical rain forest, Vietnam. Journal of Biogeography 20 (2): 109-121. https://doi.org/10.2307/2845744
- Swaay CA, Nowicki P, Settele J, Strien AJ (2008) Butterfly monitoring in Europe: methods, applications and perspectives. JBCR 17: 3455-3469.

Supplementary material

Suppl. material 1: Abundance of butterfly species across transect sites doi

Authors: Dang Ngoc Hiep, Huynh Duc Hoan
Data type: occurrences
Brief description: Butterfly abundance data for the transects L1-L12.
Download file (12.35 kb)